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An American National Standard

Standard Guide for Selection of Shipboard Incinerators[1]

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1. Scope

1.1 This guide covers selection criteria to assist procurers in selecting the appropriate incinerator for their needs.

1.2 This guide is a companion document to Specification F 1323.

1.3 This guide does not apply to incinerator systems on special incinerator ships, for example, for burning industrial wastes such as chemicals, manufacturing residues, and so forth.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

F 1323 Specification for Shipboard Incinerators

2.2 *Other Document:*[3]

MARPOL 73/78

3. Selecting the Incinerator Size and Installed Location

3.1 A number of factors will govern the selection of the size and type of shipboard incinerator and full consideration must be given to each. The installed operating location of the unit is of equal importance to ensure low-cost operating, ease of charging, ease of cleaning, and so forth. Consideration should be given to the following:

3.1.1 Maximum amount of each type of waste that will be incinerated each day.

3.1.2 The normal number of hours per day that the incinerator will be in operation: loading procedure batch/continuous over operating hours.

3.1.3 Can wet and dry material be loaded into the incinerator so that a large volume of auxiliary fuel is not required?

3.1.4 Can the incinerator be installed on the ship in a location near the major source of refuse so as to minimize the manpower requirements during loading operations?

3.1.5 Will ashes be able to be removed easily if the incinerator is installed in the machinery space or on a lower deck? Will ash removal be manual (shoveling) or semiautomatic (plow)?

4. Estimating Daily Quantities of Waste to Be Incinerated

4.1 *Size of Ship's Crew*:

4.1.1 Galley waste estimate: 2 lb per crew member per day.

4.1.2 Crews quarters waste estimate: 1.5 lb per room per day.

4.2 *Number of Passengers Carried*:

4.2.1 Galley waste estimate: ¾ lb per meal served.

4.2.2 Passenger quarters waste estimate: 1.5 lb per room per day.

4.3 *Stores*—Including amount of packages and packages that would add to the ship's garbage.

4.4 Spent oil.

5. Factors for Selection

5.1 *Type of Unit*—Two-stage controlled air, or single-stage, compact high-temperature cyclone incinerator.

5.2 Size of unit (number of people on board).

5.3 Loading considerations (manual loader) (batch or continuous).

5.4 Auxiliary liquid waste capability (sludge oil/waste oil).

5.5 Installation considerations (indoor/outdoor).

5.6 Environmental considerations (in port usage).

5.7 Heat recover options (amount of steam or hot water).

5.8 Ash removal.

5.9 Induced draft fan requirements.

5.10 Modular/package.

5.11 Dimensions/weight.

6. Classification of Shipboard Wastes and Incinerators

6.1 The basis for satisfactory incinerator operation is the proper analysis of the waste to be destroyed and the selection of proper equipment to best destroy that particular waste.

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[1] This guide is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.06 on Marine Environmental Protection.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from the International Maritime Organization, 4 Albert Embankment, London SE1 7SR, UK.

6.2 As a guide, mixtures of waste most commonly encountered have been classified into types of waste, together with the British Thermal Unit (Btu) values and moisture contents of the mixtures.[4] A concentration of one specific waste in the mixture may change the Btu value or the moisture content, or both, of the mixture. A concentration of more than 10 % by weight of catalogs, magazines, or packaged paper will change the density of the mixture and affect burning rates.

6.3 Similarly, incinerators have been classified by their capacities and by the types of wastes they are capable of incinerating.

6.4 *Classification of Shipboard Wastes*—The following classification of shipboard wastes differs from the definition of garbage as found in Annex V of MARPOL 73/78, which includes all of the types listed on this page.

6.4.1 *Type 0*—Trash, a mixture of highly combustible waste, such as paper, cardboard, cartons, wood boxes, and combustible floor sweepings from commercial and industrial activities. The mixtures contain up to 10 % by weight of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oil rags, and plastic or rubber scraps.

6.4.1.1 This type of waste contains 10 % moisture, 5 % incombustible solids, and has a heating value of 8500 Btu/lb as fired.

6.4.2 *Type 1*—Rubbish, a mixture of combustible waste, such as paper, cardboard cartons, wood scrap, foliage, and combustible floor sweepings, from domestic, commercial, and industrial activities. The mixture contains up to 20 % by weight of galley or cafeteria waste, but contains little or no treated papers, plastic, or rubber wastes.

6.4.2.1 This type of waste contains 25 % moisture, 10 % incombustible solids, and has a heating value of 6500 Btu/lb as fired.

6.4.3 *Type 2*—Refuse, consisting of an approximately even mixture of rubbish and garbage by weight.

6.4.3.1 This type waste is common to passenger ships occupancy, consisting of up to 50 % moisture, 7 % incombustible solids, and has a heating value of 4300 Btu/lb as fired.

6.4.4 *Type 3*—Garbage, consisting of animal and vegetable wastes from restaurants, cafeterias, galleys, sick bays, and like installations.

6.4.4.1 This type of waste contains up to 70 % moisture, up to 5 % incombustible solids, and has a heating value of 2500 Btu/lb as fired.

6.4.5 *Type 4*—Aquatic life forms and animal remains, consisting of carcasses, organs and solid organic wastes from vessels carrying animal type cargos, consisting of up to 85 % moisture, 5 % incombustible solids, and having a heating value range of 1000 Btu/lb as fired.

6.4.6 *Type 5*—By-product waste, liquid or semiliquid, such as tar, paints, solvents, sludge, oil, waste oil, and so forth, from shipboard operations. Btu values must be determined by the individual materials to be destroyed.

6.4.7 *Type 6*—Solid by-product waste, such as rubber, plastics, wood waste, and so forth, from industrial operations. Btu values must be determined by the individual materials to be destroyed.

[4] The original source of data for these classifications is the Incinerator Institute of America Waste Classification, available from the Incinerator Institute of America, 60 E. 42nd St., New York, NY 10017.